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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/993,503      | 11/27/2001  | Hoi-Sik Moon         | 6192.0193.AA        | 8146             |

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EXAMINER

NGUYEN, HOAN C

ART UNIT PAPER NUMBER

2871

DATE MAILED: 05/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 09/993,503             | MOON, HOI-SIK       |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | HOAN C. NGUYEN         | 2871                |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413)          |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. ____.  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____.   | 6) <input type="checkbox"/> Other: ____.                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

Applicant's election with traverse of Group I (claims 1-10), Paper on 12/18/2003 is acknowledged. Applicant's arguments regarding the restriction requirement have been considered and have found persuasive. Therefore, claims 1-12 will be considered in this office action.

### ***Drawings***

Figures 1, 2, 4A-D, 8B and 10A-E should be designated by a legend such as --Prior Art

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 1-7 and 9-12 are rejected under 35 U.S.C. 102(a) as being anticipated by a prior art (Figs 1-2 and 10A-E) admitted by applicant.

In regard to claims 1 and 10, applicant admits (Figs. 1-2) as a prior art that a method for bonding an adherent member to a printed circuit board comprising the steps of:

- providing the printed circuit board 30 having
  - a substrate and

- a plurality of a first conductive pattern group (PCB land not shown in the Drawing) formed at a peripheral portion of the substrate in the direction of the length of the substrate

wherein the first conductive pattern group is adjusted according to a thermal expansion degree of the substrate where the first conductive pattern group is positioned (page 8 line 13 to page 9 line 4). *This adjustment of the first conductive pattern group (PCB land not shown in drawing) due to the thermal expansion causes misaligning between PCB and TCP* (all see 112 rejection above).

- providing the adherent member (TCP 50) having a plurality of a second conductive pattern group (leads of TCP) corresponding to the first conductive pattern group;
- aligning the adherent member and the printed circuit board each other;
- bonding the adherent member to the printed circuit board by a thermo-compression bonding method.

wherein

- the adjusted amount of the first conductive pattern group has the largest value at both ends of the substrate and the adjusted amount of the first conductive pattern group decreases toward a point dividing the substrate into two portions as Graphs 10A-10E shown for the misalignment of each sample on the basis of the central line of the conventional printed circuit board according to the table 9 (claim 2).

- a thermal reaction property of a first half portion of the substrate is different from a thermal reaction property of a second half portion of the substrate when the substrate is divided lengthwise as shown in Fig 2A and Graph 10A-E (claim 3).
- an adjusted amount of the first conductive pattern group positioned at the first half portion (right portion) of the substrate is larger toward the point at TAB than an adjust amount of the first conductive pattern group positioned at the second half portion (left portion) of the substrate wherein the thermal reaction property of the first half portion of the substrate is larger than the thermal reaction property of the second half portion of the substrate as Figs. 10A-E shown the right portion is larger toward the point at TAB (claim 4).
- intervals among the first conductive pattern group positioned at the first half portion of the substrate is larger than intervals among the first conductive pattern group positioned at the second half portion of the substrate wherein the thermal reaction property of the first half portion of the substrate is larger than the thermal reaction property of the second half portion of the substrate. Figs. 10A-E show the first half portion located at TAB8 toward center and the second half portion located at TAB1 toward center; wherein the first half portion has larger thermal expansion, therefore the intervals among the first conductive pattern group positioned at the first half portion of the substrate is larger according to claim 5.

- the thermo-compression bonding is performed through interposing an anisotropic conductive film between the printed circuit board and the adherent member (page 4 lines 3-5, page 6 lines 10-14, page 7 lines 1-9) according to claim 6.
- the second conductive pattern group has intervals aligned with the first conductive pattern group before the first conductive pattern group is adjusted (page 8 lines 13-14 cites PCB land group of PCB 30 and leads of TCP 50 are aligned) according to claim 7.
- the printed circuit board is connected to a thin film transistor substrate of a liquid crystal display device (page 5 lines 9-14) according to 9.

In regard to claim 11, applicant admits (Figs. 1-2) as a prior art that a liquid crystal display device, comprising:

- a liquid crystal display panel 12 having
  - a thin film transistor substrate 14 and
  - a color filter substrate 12 attached to the thin film transistor substrate by interposing a liquid crystal between the color filter substrate and the thin film transistor substrate;
- a printed circuit board 30 electrically connected to the liquid crystal display panel; and
- an adherent member (TCP 50) electrically connecting the liquid crystal display panel to the printed circuit board to operate the liquid crystal display panel, the

adherent member attached to the printed circuit board by a thermo-compression bonding method (page 6 lines 10-14),

wherein a misalignment amount of a conductive pattern group of an output of the printed circuit board is identical to a misalignment amount of a conductive pattern group of an input of the adherent member (page 8 lines 13-14 cites PCB land group of PCB 30 and leads of TCP 50 are aligned; therefore, the misalignment must be identical).

wherein

- a thermal reaction property (thermal expansion) of one half portion of the printed circuit board is different from a thermal reaction property of the other half portion of the printed circuit board when dividing the printed circuit board lengthwise as shown in Figs. 2A and Graph10A-E (claim 12).

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***Claim Rejections - 35 USC § 103***

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over a prior art (Figs 1-2) admitted by applicant as applied to claims 1-4, 6-7 and 9-12 in view of Tanaka et al. (US6336990B1).

Tanaka et al. teaches(Fig. 5 line e, col. 6 lines 54-67) the thermo-compression bonding is performed at a temperature of about 200 °C for bonding the terminals of PCB and TCP.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a method for bonding an adherent member to a printed circuit board with the thermo-compression bonding performed at a temperature of about 200 °C for bonding the terminals of PCB and TCP.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Takahashi et al. (US5936850A) disclose a circuit board connection structure is formed by a first substrate having a first electrode pattern, a second substrate having a second electrode pattern, and a film circuit member electrically connecting the first and second electrode patterns.

James et al. (US6583515B1) disclose a ball grid array package for enhanced stress tolerance.

Ouchi et al. (US6320691B1) disclose method of connecting first electrodes formed on a first substrate to second electrodes formed on a second substrate and partially coated with a resist pattern so as to substantially expose an opening thereof at a surface of the second electrodes.



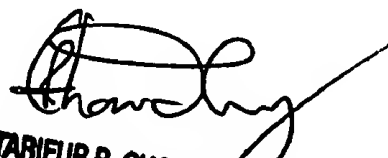
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim H Bobert can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HOAN C. NGUYEN  
Examiner  
Art Unit 2871

Chn

  
TARIFUR R. CHOWDHURY  
PRIMARY EXAMINER